

Effect of Curcuminoids in Turmeric on Developing Zebrafish Treated with Ethanol

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This experiment was designed with the intention of determining whether turmeric could act as a rescue agent to prevent or mitigate the extent of Fetal Alcohol Spectrum Disorder (FASD) caused by early ethanol exposure using zebrafish as a model system. A range of turmeric concentrations were made from a stock solution of turmeric dissolved in ethanol (1mg turmeric in 5mL ethanol). The active agents in turmeric are the curcuminoids: Curcumin, Desmethoxycurcumin, and Bisdemethoxycurcumin. The curcuminoids concentration was estimated using liquid chromatography. These agents were present in the turmeric stock solution at the following concentrations: Bisdemethoxycurcumin: 36.6 +/- 0.1 ug/mL, Desmethoxycurcumin: 43.4 +/- 0.1 ug/mL, and Curcumin: 124.1 +/- 0.2 ug/mL. Untreated zebrafish embryos were placed in embryo medium, ethanol treated embryos in 100mM ethanol containing embryo medium, and turmeric co-supplemented medium with differing concentrations of turmeric. Since the turmeric stock solution was dissolved in ethanol, the concentration of ethanol was kept at a constant 100mM ethanol and the amount of turmeric solution added. The concentrations of the test plates were then based on this solution and made to be 100 mM ethanol and 1.16 uM curcuminoids, 100 mM ethanol and 1.74 uM curcuminoids, and 100 mM ethanol and 2.32 uM curcuminoids. The developing embryos were treated with the turmeric solution and/or ethanol during 2-24 hours post fertilization (hpf). These embryos were imaged at 72 hpf and their body length and eye diameter were measured. The embryos supplemented with curcuminoids showed a significant rescue effect on the body length and eye diameter compared to ethanol treated embryos. This indicates that the curcuminoids acted as a rescue agent to reduce the effects that are typical of FASD in developing zebrafish.